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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/580,963	07/19/2006	Akihiko Nishio	L9289.06161	2534

52989 7590 09/04/2008

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EXAMINER	
CHAKOUR, ISSAM	

ART UNIT	PAPER NUMBER
4163	

MAIL DATE	DELIVERY MODE
09/04/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/580,963	NISHIO ET AL.	
	Examiner	Art Unit	
	ISSAM CHAKOUR	4163	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-11* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-11* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05/31/2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *05/31/2006;07/19/2006*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. Claims 1-3 and 11 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Jafarkhani et al (US 6,445,747) in view of Miller (5,621,762).

4. Regarding claims 1 and 11, Jafarkhani discloses a radio transmission apparatus (See Figure 2) comprising:

a coding section (or encoder, see column 2, line 64-65) that codes data;

a modulation (also the encoder, see column 3, line 11) section that generates a symbol from coded data and places the symbol in one of a plurality of signal points on an IQ plane (e.g. the constellation symbols which is the representation in the IQ plane of the modulated data bits or signal, see column 3, line13);

an assignment section that assigns the generated symbol to one of a plurality of sub-carriers (see figure 2, item 205) constituting a multi-carrier signal (or see column 1, line 20-21);

a changing (or shifting) section (or Encoder Phase Shifter, see figure 2, item 213) that changes a phase of each of the plurality of sub-carriers (See claim 11)

and a transmission section (e.g. RF device or transmitter, see figure 2,item 209) that transmits the multi-carrier signal to a radio reception apparatus.

Jafarkhani fails to explicitly teach that the changing or scaling section changes the phase of each of the plurality of sub-carriers within a range that does not cross a decision boundary between the signal point in which a symbol assigned to each of the plurality of sub-carriers is placed and an adjacent signal point;

a generating section that generates a multi-carrier signal from the plurality of sub-carriers with changed phases. However, Miller discloses a method wherein changing or scaling section changes the phase of each of the plurality of sub-carriers (See column 3, lines 53-59) within a range that does not cross a decision boundary between the signal point in which a symbol assigned to each of the plurality of sub-carriers is placed at an adjacent signal point (See column 4, lines 37-39);

a generating section that generates a multi-carrier signal from the plurality of sub-carriers with changed phases (See column 4, lines 42-44).

Note that the process of shifting the phase so that the signal points in the IQ plane do not overlap is an essential condition in order to perform the maximum likelihood detection at the receiver for an uncorrupted signal demodulation and re-construction. It would have been obvious to one of ordinary skill in the art to combine the invention as claimed by Jafakhani with the teaching of Miller, because at particular signal point overlapping adjacent symbols may add up constructively producing large undesirable peaks. Furthermore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the decision boundaries when shifting the phase because it would constitute a form of compensation for controlling the peak power level and suppressing it accordingly.

5. Regarding claims 2 and 3, Jafarkhani in view of Miller discloses the radio transmission apparatus according to claim 1. Jafarkhani in view of Miller fails to teach that the radio transmission apparatus wherein the changing section further changes/decreases an amplitude or magnitude of each of the plurality of sub-carriers within the range that does not cross the decision boundary between the signal points in which the symbol assigned to each of the plurality of sub-carriers is placed and the adjacent signal point. However, Miller further teaches a changing section further changes (or scales) an amplitude or magnitude (See column 3, line 53-60) and decreasing the amplitude or magnitude (See column 4, lines 22-24) of each of the plurality of sub-carriers within the range that does not cross or overlap the decision

boundary between the signal point in which the symbol assigned to each of the plurality of sub-carriers is placed and the adjacent signal point (See column 1, lines 24-29). It would have been obvious to one of ordinary skill in the art to add said feature taught by Miller in Jafarkhani's invention because changing/decreasing the amplitude along with the phase accordingly would further limit and suppress peak power levels as both of these elements of a signal (magnitude and phase) contribute to power spikes in multi-carriers multiplexed transmission such as OFDMA transmission mode. Furthermore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the decision boundaries when shifting the phase because it would constitute a form of feedback for controlling the peak power level and suppressing it accordingly.

6. Claim 4 rejected under 35 U.S.C. 103(a) as being unpatentable over Jafarkhani in view of Miller as applied to claim 1 above, and further in view of Verma (US 6,757,299).

7. In claim 4, Jafarkhani in view of Miller teaches the radio transmission apparatus according to claim 1. Jafarkhani in view of Miller does not disclose a further determination section that measures peak power of the multi-carrier signal and determine whether or not the peak power is equal to or greater than a threshold, wherein the changing section increases a change amount when the peak power is equal to or greater than the threshold. However, Verma discloses a multi-carrier system comprising a determination section that measures peak power (See column 4, lines 65-67) of the multi-carrier signal and determine whether or not the peak power is equal to

or greater than a threshold, wherein the changing section increases a change (e.g. compensate in a controlled fashion) amount when the peak power is equal to or greater than the threshold (See column 3, lines 20-32). It would have been obvious to one of ordinary skill in the art to modify Jafarkhani's invention such that the peak power control suppression is done by sensing or detecting peaks in the transmitting power as opposed to compensation by changing the phase of each sub-carrier, because measuring for a threshold amplitude constitutes another way for controlling output power by the corresponding compensations in the phase and/or amplitude.

8. Claims 5-8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jafarkhani in view of Miller as applied to claim 1 above, and further in view of Sudo (US 2006/0160498).

9. Regarding claim 5, Jafarkhani in view of Miller teaches the radio transmission apparatus in accordance with claim 1, but Jafarkhani in view of Miller does not disclose the apparatus wherein the modulation section performs adaptive modulation per sub-carrier; and the changing section decreases a change amount as an M-ary modulation level used in the modulation section is greater. However, Sudo does disclose a modulation section in a transmitting apparatus where it performs adaptive modulation (See paragraph [0033], line 6-9) per sub-carrier (See paragraph [0035], line 9); and the changing section decreases a change amount as an M-ary modulation level used in the modulation section is greater (See paragraph [0083], lines 6-13). It would have been obvious to one of ordinary skill in the art to incorporate the feature as taught by Sudo in

the invention of Jafarkhani in view of Miller given that said is widely implemented in most third generation networks because adaptive modulation adjusts to degradation parameters and variation characterizing the communication channel and compensate accordingly between transmission rate, quality of reception while conserving power (See paragraph [0040] in Razavilar et al, US 2003/0104831).

10. In claim 6, Jafarkhani in view Miller teaches the radio transmission apparatus according to claim 1, Jafarkhani in view of Miller fails to teach the apparatus wherein: the modulation section performs adaptive modulation per sub-carrier; and the changing section makes a sub-carrier among the plurality of sub-carriers subject to change, the sub-carrier having a difference equal to or greater than a threshold, between reception quality at the radio reception apparatus and required quality for a modulation scheme used in the modulation section. However, Sudo teaches the modulation section performs adaptive modulation per sub-carrier as discussed above; and the changing section (e.g. control section, see figure 9, item 901) makes a sub-carrier among the plurality of sub-carriers subject to change, the sub-carrier having a difference equal to or greater than a threshold, between reception quality (See figure 9, input to control section 902) at the radio reception apparatus and required quality for a modulation scheme used in the modulation section (See paragraph [0074]). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the transmitting apparatus disclosed by Jafarkhani with the feature of changing the sub-carrier based on threshold of the difference between measured modulation scheme

quality and the received signal quality at the receiving apparatus, because the adaptive modulation given that it is widely implemented in most third generation networks, has to take into account not only the thresholds set by the modulation scheme but also the feedback information regarding the channel quality that affects good reception and accordingly adjusts to better modulation scheme within a threshold that allows constant power average.

11. As for claim 7, Jafarkhani in view Miller, and further in view of Sudo discloses the limitation in accordance with claim 6; Sudo further teaches the apparatus, wherein the changing section determines a change amount according to the difference between (or comparison) the reception quality and the required quality (or the predetermined threshold) (See paragraph [0136]). It would have been obvious to one of ordinary skill in the art at the time of the invention to combine the transmitting apparatus disclosed by Jafarkhani in view of Miller with the feature of changing the sub-carrier based on threshold of the difference between measured modulation scheme quality and the received signal quality at the receiving apparatus, because the adaptive modulation given that it is widely implemented in most third generation networks, has to take into account not only the thresholds set by the modulation scheme but also the feedback information regarding the channel quality that affects good reception and accordingly adjusts to better modulation scheme within a threshold that allows constant power average.

12. Regarding claim 8, Jafarkhani in view of Miller discloses the radio transmission apparatus according to claim 1, Jafarkhani in view of Miller fail to disclose the apparatus wherein:

the coding section codes the data to generate a systematic bit and a parity bit;

the modulation section modulates the systematic bit and the parity bit generated in the coding section to generate a symbol; and the changing section makes a sub-carrier, to which a symbol comprised of only the parity bit is assigned, subject to change among the plurality of sub-carriers. Nonetheless Sudo teaches the apparatus such that the coding section codes the data to generate a systematic bit and a parity bit (See abstract, line 1-3); the modulation section modulates the systematic bit and the parity bit generated in the coding section to generate a symbol (See abstract, line 3-4); and the changing section makes a sub-carrier, to which a symbol comprised of only the parity bit is assigned, subject to change among the plurality of sub-carriers (See paragraph [0077]). Note that when interferences are present in OFDMA error correction coding promises relatively better quality when transmitting OFDMA signals; by coding data such as the systematic bit and parity in bit in the transmitted data, error rate characteristics are improved and the data are transmitted significantly in a better quality. Note also that systematic bit data are required for ensuring better quality signal. It would have been obvious to one of ordinary skill in the art to implement Jafarkhani's invention with the features taught by Sudo, because when interferences are present and good quality of transmitted data is required, error coding by way of generating systematic and parity bit data improves error rate characteristics, and since the systematic bit is

required for better signal transmission in such conditions, sub-carriers in which the modulated data include only the parity bit and not the systematic bit or the combination, the sub-carrier of said parity bit could be attenuated and shifted as to avoid constructive interferences therefore decreasing the peak power.

13. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jafarkhani in view of Miller as applied to claim 1 above, and further in view of Razavilar et al (US 2003/0104831).

14. Regarding claims 9 and 10, Jafarkhani in view of Miller discloses the apparatus in accordance with claim 1. Jafarkhani in view of Miller does not explicitly teach a radio communication base station apparatus comprising the radio transmission apparatus according to claim 1, however, Razavilar discloses an apparatus using an adaptive modulation and power control algorithm in both a mobile terminal (e.g. RT1) and in an access point (AP1)or base-station (See figure 2). It would have been obvious to one of ordinary skill in the art at the time of the invention to implement the transmitting apparatus in mobile terminals and base-station as taught by Jafarkhani in view of Miller because the features implemented in the apparatus offers a more reliable and power efficient communication system.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Ishida et al (US 6,590,906) teaches a transmitter circuit which suppresses the peak power by changing the phase of individual carriers in a multi-carrier network system. Similarly, Sumasu et al (US 2002/0150038) discloses a method for peak power suppression in multi-carrier communication systems. Yoshida (US 2004/0091057) discloses an OFDMA transmission apparatus employing adaptive modulation. A non-patent literature worth referring to is titled "Peak Power and Bandwidth Efficient Liner Modulation" by Scott L. Miller which discloses a method and an adaptive peak power suppression algorithm by scaling or changing the amplitude of sub-carriers in OFDM transmission mode. Whereas, a published article titled "Random Phase Updating Algorithm for OFDM Transmission With Low PAPR" by Homayoun et al suggests a method for lowering the Peak-to-Average Power Ratio which targets also the peak power by a random phase algorithm change to the sub-carriers in OFDM type of transmissions.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ISSAM CHAKOUR whose telephone number is (571)270-5889. The examiner can normally be reached on Monday-Thursday (7:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Robinson can be reached on 5712722319. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

IC

/Mark A. Robinson/

Supervisory Patent Examiner, Art Unit 4163